What is claimed is:

1. An input system based on a three-dimensional inertial navigation system and having an input part and a host device, and for detecting motion position information corresponding to three-dimensional motions of the input part and outputting the detected motion position information to the host device, comprising:

acceleration sensors for outputting pre-motion acceleration information, motion acceleration information , and post-motion acceleration information;

a rotation angle information estimation-computing portion for estimating motion rotation angle information Φ, θ, and Ψ through a predetermined computing process based on the outputted pre-motion acceleration information and post-motion acceleration information;

a conversion-computing unit for calculating the motion position information based on the estimated motion rotation angle information and the outputted motion acceleration information; and

an optimal plane-computing unit for projecting the motion position information onto an optimal plane.

2. The input system as claimed in claim 1, wherein the rotation angle information estimation-computing portion includes:

a first computing unit for calculating pre-motion rotation angle information $\Phi1$, $\theta1$, and $\Psi1$ and post-motion rotation angle information $\Phi2$, $\theta2$, and $\Psi2$ through a predetermined computing process based on the outputted pre-motion acceleration information and post-motion acceleration information; and

a second computing unit for calculating the motion rotation angle information through a predetermined computing process based on the calculated pre-motion rotation angle information and post-motion rotation angle information.

3. The input system as claimed in claim 2, wherein the first computing unit calculates the pre-motion rotation angle information Φ1 and the post-motion rotation angle information Φ2 based on equations as follows:

$$\Phi 1 = \tan^{-1}\left(\frac{A_{by1}}{A_{bz1}}\right);$$

$$\Phi 2 = \tan^{-1}\left(\frac{A_{by2}}{A_{bz2}}\right)$$

where, if coordinate axes of a body frame of the input part are denoted as X, Y, and Z, A_{by1} and A_{by2} denote the pre-motion acceleration information and the post-motion acceleration information for the Y axis, respectively, and A_{bz1} and A_{bz2} denote the pre-motion acceleration information and the post-motion acceleration information for the Z axis, respectively, and, if coordinate axes for a navigation frame are denoted as X_0, Y_0, and Z_0, Ψ1 and Ψ2 denote the pre-motion rotation angle information and the post-motion rotation angle information for the Z_0 axis, and θ1 denotes the pre-motion rotation angle information for a Y_1 axis indicating an axis after the Y_0 axis is rotated as much as Ψ1, θ2 denotes the post-motion rotation angle information for Y_1 axis indicating an axis after the Y_0 axis is rotated as much Ψ2, Φ1 denotes the pre-motion rotation angle information for the X_2 indicating an axis after the X_0 axis is rotated as much as Ψ1 and θ1, respectively, and Φ2 denotes the pre-motion rotation angle information for the X_2 axis indicating an axis after the X_0 is rotated as much as Ψ2 and θ2, respectively.

4. The input system as claimed in claim 2, wherein the first computing unit calculates the pre-motion rotation angle information θ1 and the post-motion rotation angle information θ2 based on equations as follows:

$$\theta 1 = \tan^{-1}\left(\frac{A_{bx1}}{\sqrt{A_{by1}^{2} + A_{bz1}^{2}}}\right),$$

$$\theta 2 = \tan^{-1}\left(\frac{A_{bx2}}{\sqrt{A_{by2}^{2} + A_{bz2}^{2}}}\right)$$

where, if coordinate axes of a body frame of the input part are denoted as X, Y, and Z, A_{bx1} and A_{bx2} denote the pre-motion acceleration information and the post-motion acceleration information for the X axis, respectively, and A_{by1} and A_{by2} denote the pre-motion acceleration information and the post-motion acceleration information for the Y axis, respectively, and A_{bz1} and A_{bz2} denote the pre-motion acceleration information and the post-motion acceleration information for the Z axis, respectively, and, if coordinate axes for a navigation frame are denoted as X_0, Y_0, and Z_0, Ψ1 and Ψ2 denote the pre-motion rotation angle information and the post-motion rotation angle information for the Z_0 axis, and θ1 denotes the pre-motion rotation angle information for a Y_1 axis indicating an axis after the Y_0 axis is rotated as much as Ψ1, and θ2 denotes the post-motion rotation angle information for Y_1 axis indicating an axis after the Y_0 axis is rotated as much as Ψ2.

5. The input system as claimed in claim 2, wherein the second computing unit calculates the motion rotation angle information Φ by an equation as follows:

$$\Phi(t) = a * t + b$$

where, if t_1 denotes time just before the motions, t_2 denotes time just after the motions, a denotes $[\Phi(t_2) - \Phi(t_1)]/(t_2 - t_1)$, b denotes $-a * t_1 + \Phi(t_1)$, and coordinate axes for a

navigation frame are denoted as X_0, Y_0, and Z_0, then the Ψ denotes the rotation angle information for the Z_0 axis, the θ denotes the rotation angle information for the Y_1 axis indicating an axis after the Y_0 axis is rotated as much Ψ, and the Φ denotes the rotation angle information for the X_2 axis indicating an axis after the X_0 axis is rotated as much as Ψ and θ, respectively.

6. The input system as claimed in claim 2, wherein the second computing unit calculates the motion rotation angle information θ based on an equation as follows:

$$\theta(t) = c * t + d$$

where, if t_1 denotes time just before the motions, t_2 denotes time just after the motions, c denotes $[\theta(t_2) - \theta(t_1)]/(t_2 - t_1)$, d denotes $-c * t_1 + \theta(t_1)$, and coordinate axes are denoted as X_0, Y_0, and Z_0, then Ψ denotes the rotation angle information for the Z_0 axis and the θ denotes the rotation angle information for the Y_1 axis indicating an axis after the Y_0 axis is rotated as much as Ψ.

7. An input system based on a three-dimensional inertial navigation system and having an input part and a host device, and for detecting motion position information corresponding to three-dimensional motions of the input part and outputting the detected motion position information to the host device, comprising:

acceleration sensors for outputting motion acceleration information;

a rotation angle information estimation-computing portion for estimating motion rotation angle information Φ, θ, and Ψ based on acceleration information based on the gravitational acceleration separated from the outputted motion acceleration information;

a conversion-computing unit for calculating motion position information based on the estimated motion rotation angle information and the outputted motion acceleration information; and

an optimal plane-computing unit for projecting the motion position information onto an optimal plane.

8. The input system as claimed in claim 7, wherein the rotation angle information estimation-computing portion includes:

a separation unit for separating acceleration information based on the motions of the input part itself and acceleration information based on the gravitational acceleration from the outputted motion acceleration information based on a predetermined process; and

a computing unit for calculating the motion rotation angle information through a predetermined computing process based on the acceleration information based on the separated gravitational acceleration.

9. The input system as claimed in claim 8, wherein the predetermined process for separating the acceleration information based on the gravitational acceleration from the motion acceleration information is to pass the motion acceleration information through a low-pass filter.

10. The input system as claimed in claim 8, wherein the computing unit calculates the motion rotation angle information Φ based on an equation as follows:

$$\Phi = \tan^{-1}\left(\frac{A_{by}}{A_{bz}}\right)$$

where, if coordinate axes of a body frame of the input part are denoted as X, Y, and Z, A_{by} denotes acceleration information for the Y axis and A_{bz} denotes acceleration information for the Z axis, and, if coordinate axes for a navigation frame are denoted as X_0, Y_0, and Z_0, Ψ denotes rotation angle information for the Z_0 axis, θ denotes rotation angle information for a Y_1 axis indicating an axis after the Y_0 axis is rotated as much as Ψ, and Φ denotes rotation angle information for an X_2 indicating an axis after the X_0 is rotated as much as Ψ and θ, respectively.

11. The input system as claimed in claim 8, wherein the computing unit calculates the motion rotation angle information θ based on an equation as follows:

$$\theta = \tan^{-1}\left(\frac{A_{bx}}{\sqrt{A_{by}^{\ 2} + A_{bz}^{\ 2}}}\right)$$

where, if coordinate axes for the body frame are denoted as X, Y, and Z, A_{bx} denotes acceleration information for the X axis, A_{by} denotes acceleration information for the Y axis, A_{bz} denotes acceleration information for the Z axis, and if coordinate axes for a navigation frame are denoted as X_0, Y_0, and Z_0, Ψ denotes rotation angle information for the Z_0 axis and θ denotes rotation angle information for a Y_1 axis indicating an axis after the Y_0 is rotated as much as Ψ.

12. A trajectory estimation method for an input system based on a three-dimensional inertial navigation system and having an input part and a host device, and for detecting motion position information corresponding to three-dimensional motions of the input part and outputting the detected motion position information to the host device, comprising :

(a) outputting motion acceleration information, pre-motion acceleration information, and post-motion acceleration information just after the motions;

(b) estimating motion rotation angle information Φ, θ, and Ψ through a predetermined computing process based on the outputted pre-motion acceleration information and post-motion acceleration information;

(c) calculating the motion position information based on the estimated motion rotation angle information and the outputted motion acceleration information; and

(d) projecting the motion position information onto an optimal plane.

13. The trajectory estimation method as claimed in claim 12, wherein the step(b) includes :

(b1) calculating pre-motion rotation angle information $\Phi 1$, $\theta 1$, and $\Psi 1$ and post-motion rotation angle information $\Phi 2$, $\theta 2$, and $\Psi 2$ through a predetermined computing process based on the outputted pre-motion acceleration information and post-motion acceleration information; and

(b2) calculating the motion rotation angle information through a predetermined computing process based on the calculated pre-motion rotation angle information and post-motion rotation angle information.

14. The trajectory estimation method as claimed in claim 13, wherein the step(b1) calculates the pre-motion rotation angle information $\Phi 1$ and the post-motion rotation angle information $\Phi 2$ based on equations as follows:

$$\Phi 1 = \tan^{-1}\left(\frac{A_{by1}}{A_{bz1}}\right);$$
$$\Phi 2 = \tan^{-1}\left(\frac{A_{by2}}{A_{bz2}}\right)$$

where, if coordinate axes of a body frame of the input part are denoted as X, Y, and Z, A_{by1} and A_{by2} denote the pre-motion acceleration information and the post-motion acceleration information for the Y axis, respectively, and A_{bz1} and A_{bz2} denote the pre-motion acceleration information and the post-motion acceleration information for the Z axis, respectively, and, if coordinate axes for a navigation frame are denoted as X_0, Y_0, and Z_0, $\Psi 1$ and $\Psi 2$ denote the pre-motion rotation angle information and the post-motion rotation angle information for the Z_0 axis, and $\theta 1$ denotes the pre-motion rotation angle information for a Y_1 axis indicating an axis after the Y_0 axis is rotated as much as $\Psi 1$, $\theta 2$ denotes the post-motion rotation angle information for Y_1 axis indicating an axis after the Y_0 axis is rotated as much as $\Psi 2$, $\Phi 1$ denotes the pre-motion rotation angle information for the X_2 indicating an axis after the X_0 axis is rotated as much as $\Psi 1$ and $\theta 1$, respectively, and $\Phi 2$ denotes the pre-motion rotation angle information for the X_2 axis indicating an axis after the X_0 is rotated as much as $\Psi 2$ and $\theta 2$, respectively.

15. The trajectory estimation method as claimed in claim 13, wherein the step(b1) calculates the pre-motion rotation angle information $\theta 1$ and the post-motion rotation angle information $\theta 2$ based on equations as follows:

$$\theta 1 = \tan^{-1}\left(\frac{A_{bx1}}{\sqrt{A_{by1}^{2} + A_{bz1}^{2}}}\right),$$
$$\theta 2 = \tan^{-1}\left(\frac{A_{bx2}}{\sqrt{A_{by2}^{2} + A_{bz2}^{2}}}\right)$$

where, if coordinate axes of a body frame of the input part are denoted as X, Y, and Z, A_{bx1} and A_{bx2} denote the pre-motion acceleration information and the post-motion acceleration information for the X axis respectively, and A_{by1} and A_{by2} denote the pre-motion acceleration information and the post-motion acceleration information for the Y axis respectively, and A_{bz1} and A_{bz2} denote the pre-motion acceleration information and the post-motion acceleration information for the Z axis respectively, and, if coordinate axes for a navigation frame are denoted as X_0, Y_0, and Z_0, $\Psi 1$ and $\Psi 2$ denote the pre-motion rotation angle information and the post-motion rotation angle information for the Z_0 axis, and $\theta 1$ denotes the pre-motion rotation angle information for a Y_1 axis indicating an axis after the Y_0 axis is rotated as much as $\Psi 1$, and $\theta 2$ denotes the post-motion rotation angle information for Y_1 axis indicating an axis after the Y_0 axis is rotated as much as $\Psi 2$.

16. The trajectory estimation method as claimed in claim 13, wherein the step(b2) calculates the motion rotation angle information Φ by an equation as follows:

$$\Phi(t) = a * t + b$$

where, if t_1 denotes time just before the motions, t_2 denotes time just after the motions, a denotes $[\Phi(t_2) - \Phi(t_1)]/(t_2 - t_1)$, b denotes $-a * t_1 + \Phi(t_1)$, and coordinate axes are denoted as X_0, Y_0, and Z_0, then the Ψ denotes the rotation angle information for the Z_0 axis, the θ denotes the rotation angle information for the Y_1 axis indicating an axis after the Y_0 axis is rotated as much as Ψ, and the Φ denotes the rotation angle information for the X_2 axis indicating an axis after the X_0 axis is rotated as much as Ψ and θ, respectively.

17. The trajectory estimation method as claimed in claim 13, wherein the step(b2) calculates the motion rotation angle information θ based on an equation as follows:

$\theta(t) = c * t + d$

where, if t_1 denotes time just before the motions, t_2 denotes time just after the motions, c denotes $[\theta(t_2) - \theta(t_1)]/(t_2 - t_1)$, d denotes $-c * t_1 + \theta(t_1)$, and coordinate axes are denoted as X_0, Y_0, and Z_0, then Ψ denotes the rotation angle information for the Z_0 axis and the θ denotes the rotation angle information for the Y_1 axis indicating an axis after the Y_0 axis is rotated as much as Ψ.

18. A trajectory estimation method for an input system based on a three-dimensional inertial navigation system and having an input part and a host device, and for detecting motion position information corresponding to three-dimensional motions of the input part and outputting the detected motion position information to the host device, comprising :

(a) outputting motion acceleration information;

(b) estimating motion rotation angle information Φ, θ, and Ψ based on acceleration information based on the gravitational acceleration separated from the outputted motion acceleration information;

(c) calculating motion position information based on the estimated motion rotation angle information and the outputted motion acceleration information; and

(d) projecting the motion position information onto an optimal plane.

19. The trajectory estimation method as claimed in claim 18, wherein the step(b) includes :

(b1) separating acceleration information based on the motions of the input part itself and acceleration information based on the gravitational acceleration from the outputted motion acceleration information based on a predetermined process; and

(b2) calculating the motion rotation angle information through a predetermined computing process based on the acceleration information based on the separated gravitational acceleration.

20. The trajectory estimation method as claimed in claim 19, wherein the predetermined process in the step (b1) is to pass the motion acceleration information through a low-pass filter.

21. The trajectory estimation method as claimed in claim 19, wherein the motion rotation angle information Φ in the step(b2) is calculated based on an equation as follows:

$$\Phi = \tan^{-1}\left(\frac{A_{by}}{A_{bz}}\right)$$

where, if coordinate axes of a body frame of the input part are denoted as X, Y, and Z, A_{by} denotes acceleration information for the Y axis and A_{bz} denotes acceleration information for the Z axis, and, if coordinate axes for a navigation frame are denoted as X_0, Y_0, and Z_0, Ψ denotes rotation angle information for the Z_0 axis, θ denotes rotation angle information for a Y_1 axis indicating an axis after the Y_0 axis is rotated as much as Ψ, and Φ denotes rotation angle information for an X_2 indicating an axis after the X_0 is rotated as much as Ψ and θ, respectively.

22. The trajectory estimation method as claimed in claim 19, wherein the motion rotation angle information θ in the step(b2) is calculated based on an equation as follows:

$$\theta = \tan^{-1}\left(\frac{A_{bx}}{\sqrt{A_{by}^{2} + A_{bz}^{2}}}\right)$$

where, if coordinate axes for the body frame are denoted as X, Y, and Z, A_{bx} denotes acceleration information for the X axis, A_{by} denotes acceleration information for the Y axis, A_{bz} denotes acceleration information for the Z axis, and if coordinate axes for a navigation frame are denoted as X_0, Y_0, and Z_0, Ψ denotes rotation angle information for the Z_0 axis and θ denotes rotation angle information for a Y_1 axis indicating an axis after the Y_0 is rotated as much as Ψ.